Agriculture By the Numbers

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Editor: Bryon Parman
Assistant Professor/Agricultural Finance Specialist

701-231-8248
bryon.parman@ndsu.edu

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N.D. Relative Regional Land Prices Change With Growth in Corn and Soybean Acres

By Bryon Parman, NDSU Extension Agricultural Finance Specialist

Every year, North Dakota State University Extension takes the North Dakota Department of Trust Lands survey and combines the county data into NDSU regional data to track cropland and pastureland market values and rents[1].

These are the same regions NDSU uses for its enterprise budgets, with nine total. The regions are the southwest (SW), south-central (SC), northwest (NW), east-central (EC), north-central (NC), northeast (NE), southeast (SE), north valley (NV) and south valley (SV). The regions can be seen in the map below.

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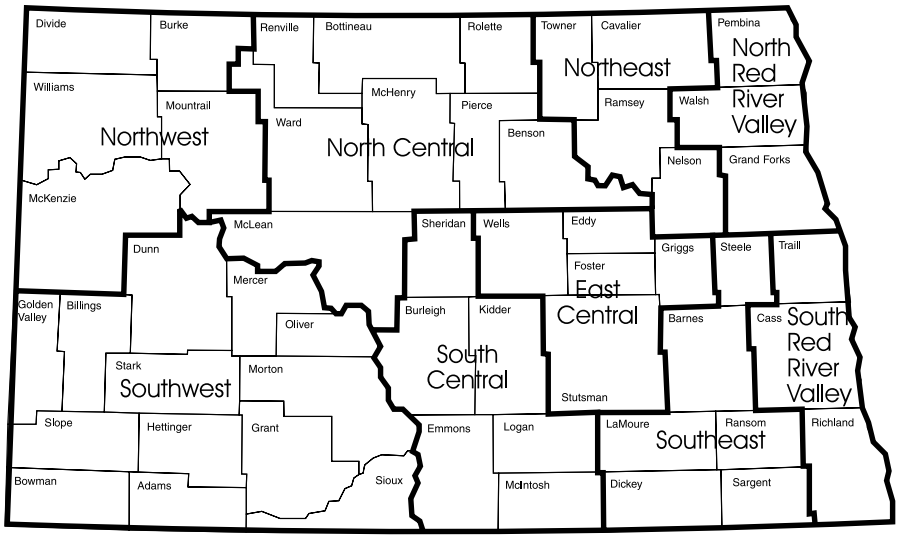
NDSU Crop Budget Regions



[1] North Dakota Department of Trust Lands, County Rents & Prices Annual Survey. Available online at https://www.land.nd.gov/resources/north-dakota-county-rents-prices-annual-survey

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For the most part, those in the agricultural industry know that the costliest farmland in North Dakota is in the eastern part of the state and the least expensive is in the western part of the state. This is due in large part to annual precipitation, soil quality and proximity to commodity buyers.

The south valley traditionally has had the highest priced cropland, with the north valley being second. Rents generally have followed the same ranking as well, with the least expensive cash rental rates in the west and the most expensive in the east.

However, outside of the two Red River Valley regions, the relative price as far as highest vs. lowest cost of each district's land has changed remarkably. In 2002, the southwest and south-central regions were below $300 per acre in market value and the least expensive in the state, while the northwest and east-central were about $350 per acre.

The north-central and northeast districts were about $400 per acre in 2002, while the southeast was closer to $500 per acre. The north valley and south valley average cropland values were $750 and $898 per acre, respectively, in 2002.

While every region has increased in value since then, some regions have increased more than others. In fact, five regions - the south valley, north valley, northeast, north-central and southwest - have all experienced a yearly growth rate of between 7.5% and 8%. These regions have grown near the state average, which is approximately 8.2% in year-over-year growth.

Three regions, however, grew at a rate well above average. The south-central grew at 9.7% per year, the east-central grew at 9.2% and the southeast grew at a rate just in excess of 9%.

The northwest region, on the other hand, experienced the slowest growth rate in cropland market values at approximately 6.8%. What also should be noted is that while the percentages stated above are yearly growth rates, most of the increase in value took place from 2009 to 2014, as shown in Figure 1.

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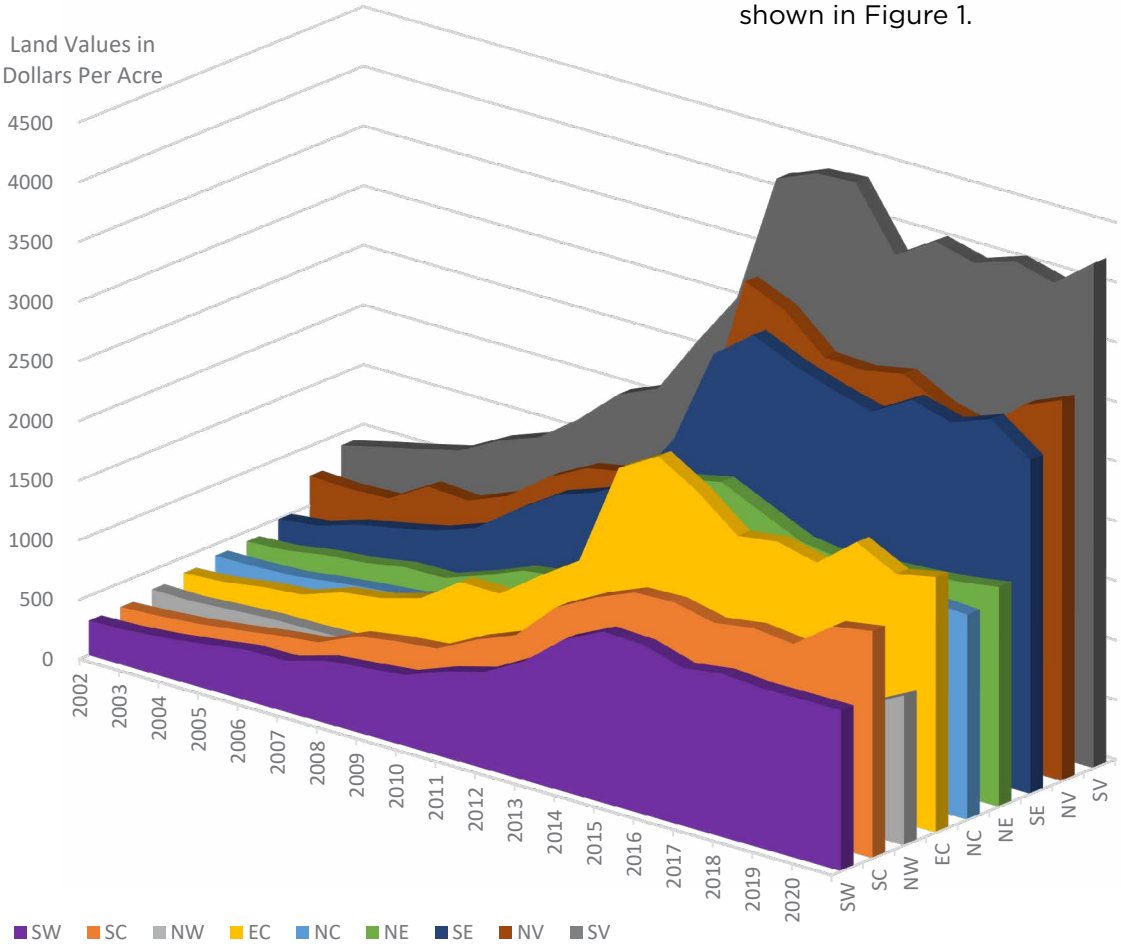

Figure 1. North Dakota Land Values in Dollars per Acre From 2002 to 2021 for Nine NDSU Extension Regions

N.D. Relative Regional Land Prices Change With Growth in Corn and Soybean Acres

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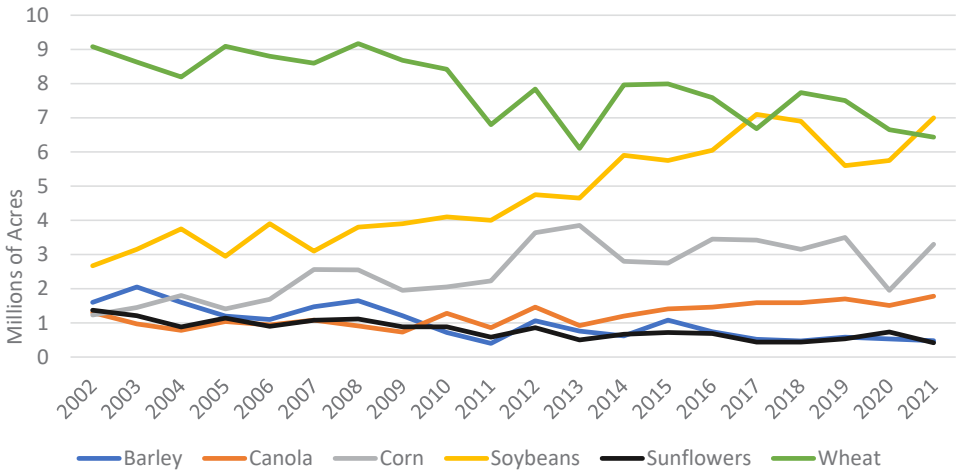
A big reason for the differing growth rates has been the ability for some regions to grow the modern varieties of corn and soybeans that are tailored more closely to North Dakota's climate. From approximately 2006 to 2012, prices for soybeans and corn sustained a high price across the U.S. At the same time, genetics for corn and soybeans had improved for the northern Plains, where varieties were better suited to the shorter growing season.

Planted Acres of Selected Crops in North Dakota, 2002 to 2021



Also, the development of no-till methods for soybeans and chemical weed control made growing very respectable yields possible to do in North Dakota. As a result, an acres shift away from wheat, barley, and sunflowers to more corn and soybeans has occurred in some regions.

In 2002, the U.S. Department of Agriculture's planted acreage data for North Dakota showed that more than 9 million acres of wheat (including all types of wheat), 1.37 million acres of sunflowers and 1.6 million acres of barley were planted. In other years, wheat was well above 9 million, and barley and sunflowers closer to 2 million acres. During that same time, about 3 million acres of soybeans and around 1.5 million acres of corn were planted.

By 2010, planted acreage numbers had shifted quite a bit as corn exceeded 2 million acres and soybeans exceeded 4 million acres, mostly at the expense of wheat acres and barley. During the last few years, about 7 million acres of soybeans per year and 3.5 million acres of corn have been planted. Wheat has been under 7 million, with barley and sunflowers closer to 500,000. The table below shows how this has impacted land prices in the NDSU regions.

Areas in the state that are not as well suited for corn and soybeans have tended to experience slower growth rates than those that are. For instance, the northwest region grew at a well below average rate of 6.79% while the south-central grew at more than 9.7%.

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In fact, the southeast region has nearly surpassed the north Red River Valley region in land price in 2021, while in 2002, it was only at about 67% of the price. The east-central region went from having the sixth highest land price and about the same cost as the northwest in 2002 to the fourth highest priced land and nearly 70% higher than the northwest region.

Cash rents have followed a similar path, with southern and central regions growing faster than northern regions. While the growth in land prices has outpaced rents, the south-central and southeast regions have grown at more than 4% per year. The south valley and east-central have grown yearly at just under 4%. However, near the bottom are the northwest and north-central regions.

The relative rankings in the highest cash rents vs. the lowest, as in land prices, have shifted as well. In fact, the southeast has surpassed the north valley as having the second highest cash rents and the east-central has grown well above the north-central despite being about the same in 2002.

The data clearly indicates that genetic and production method improvements, along with prices, have had a large impact on land values and cash rental rates in North Dakota, specifically the growth in corn and soybean acres at the expense of other crops. However, not all regions of the state are as well suited for the varieties designed for the northern Plains. As a result, some regions have experienced much higher growth rates in land values and rents than other regions.

That is especially true in the southeast, south-central and east-central, which in 2002 were well below the Red River Valley regions in land price and rent but have closed the gap considerably when compared with the north valley region. In general, the growth rates from 2002 to 2021 in land prices and cash rents show which regions have been impacted the most by the growth in corn and soybean acres, with those regions increasing in price faster.

2002 to 2021 North Dakota State Regional Land Prices in $/acre and Year-Over-Year Growth Rates

Region	2002 Land Price/Rank	2021 Land Price/Rank	Growth Rate
SW	$292 (9)	$1,351 (8)	7.955%
SC	$298 (8)	$1,909 (5)	9.737%
NW	$338 (7)	$1,260 (9)	6.792%
EC	$368 (6)	$2,145 (4)	9.214%
NC	$405 (5)	$1,722 (7)	7.506%
NE	$417 (4)	$1,847 (6)	7.728%
SE	$497 (3)	$2,805 (3)	9.035%
NV	$750 (2)	$3,196 (2)	7.515%
SV	$898 (1)	$4,234 (1)	8.060%

2002 to 2021 North Dakota State Regional Cash Rental Rates in $/acre and Yearly Growth Rates

Region	2002 Cash Rent / Rank	2021 Cash Rent / Rank	Growth Rate
SW	$23.85 (9)	$37.02 (8)	2.221%
SC	$24.99 (8)	$56.05 (6)	4.121%
NW	$25.35 (7)	$35.00 (9)	1.627%
NC	$31.92 (6)	$51.10 (7)	2.381%
EC	$32.31 (5)	$69.46 (4)	3.901%
NE	$32.87 (4)	$58.40 (5)	2.915%
SE	$40.67 (3)	$94.66 (2)	4.315%
NV	$47.87 (2)	$92.04 (3)	3.323%
SV	$58.88 (1)	$128.45 (1)	3.977%

Drought and Corn Price Volatility Impacts Summer Calf Grazing Outlook

By Tim Petry, Extension Livestock Economist

May usually brings thoughts of summer calf grazing potential for some cattle producers.

While the economics may look favorable, extreme drought in much of North Dakota is the primary concern for summer grazing potential. The current U.S. Drought Monitor

(**https://droughtmonitor.unl.edu**) indicates 76% of the state is in D3 (extreme drought) status, with 17% in D2 (severe drought), 5% in D1 (moderate drought) and 2% in D0 (abnormally dry). Predictions, which can be wrong, are for drought conditions to continue into the summer.

So, the first question is: Will enough forage even be available to support a summer calf grazing program?

Spring grazing conditions in some states to the south, including Oklahoma, Kansas, Missouri and Arkansas, have been good enough to spark the demand for lightweight calves. And southern and Appalachian states from Mississippi up through Tennessee have received ample rainfall with good forage production.

Corn prices have increased about $3.50 per bushel since August 2020 with strong export demand. That has increased feed costs for feeding cattle significantly from last year. Higher feed costs mean that feedlots now prefer to purchase heavier weight feeder cattle that have been raised on cheaper forage-based programs.

The U.S. Department of Agriculture's National Agricultural Statistics Service Planting Intentions report released on March 31 indicated farmers intend to plant fewer corn acres than expected. Since then, May corn futures prices have increased $1.20/bushel while May feeder cattle futures prices declined about $12 per hundredweight (cwt). That corresponds to the long-held adage of "a 10 cent/bushel change in corn prices causes a $1/cwt change in calf prices in the opposite direction."

Prices for calves and feeder cattle have declined in the last few weeks due to drought conditions and increasing corn prices. But they are being supported by lower supplies. The 2020 U.S. calf crop was down 1%. And the feeder cattle supply outside of feedlots in April was estimated to be down about 700,000 head from last year.

Price support for heavier feeder cattle also is coming from live cattle futures prices for the last half of 2021 and first half of 2022, which are the highest in several years.

Purchasing or retaining calves to summer graze is a "margin" enterprise, so computing expected costs and returns is important. Shown here and on my website (**www.ag.ndsu.edu/livestockeconomics/Budgets**) is a summer grazing budget that can be used for planning purposes. Example costs and returns are shown, and the spreadsheet allows users to input expected numbers.

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Drought and Corn Price Volatility Impacts Summer Calf Grazing Outlook — continued from page 5

This week, a wide range occurred in feeder cattle prices at North Dakota livestock auctions reported by the USDA Agricultural Marketing Service. Prices for 550- to 600-pound steers ranged from $153 to 176/cwt, with an average of $164.35. Prices for 750- to 800-pound steers ranged from $133 to $140.50/cwt and averaged $138.77. CME Group feeder cattle futures prices for August and September traded at about $150/cwt. (see chart).

So in the budget, I assumed a 550-pound steer calf purchase price or value if already owned at $1.67/cwt. The expected selling price for the 800-pound steer in the fall was $144, which is lower than the futures market but similar to the last two years.

With the example costs and returns shown in the budget, a return to labor and management of $82.81 per head was projected.

Feeder cattle prices are expected to be volatile throughout the summer, with changing weather conditions and fed cattle prices. Corn planting progress, final planted acres, crop development and expected yield information, along with a dynamic corn export market, likely will cause significant corn price volatility.

The budget indicates that a 10% lower than expected selling price of $129.60/cwt could result in a loss of $32.39/head.

So, with all the uncertainty, we have a risk of lower fall feeder cattle prices. A marketing plan that includes price risk management strategies should be considered.

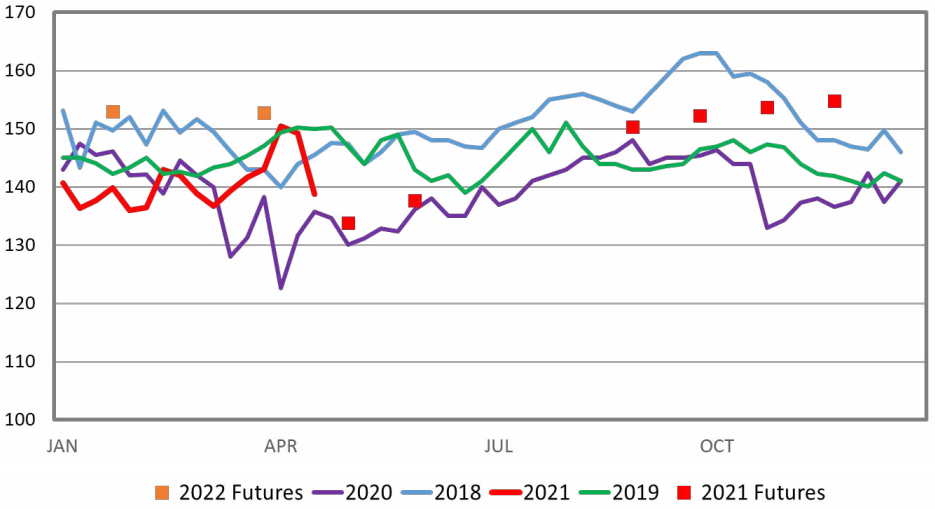
Summer 2021 Grazing Budget

(costs — $/head)

		Example		Your #s
1. Pasture	(4 A @ $ 20.00)	80.00	(A @ $)	0.00
2. Minerals, salt		0.50		
3. Purchased Feed and Supplement				
4. Veterinary, drugs, implants		12.00		
5. Marketing (brand inspection, commission, check off, hauling)		20.00		
6. Shrink		2.00		
7. Utilities, fuel, oil		5.00		
8. Hired Labor				
9. Repairs (fencing, waterers, etc.)		3.00		
10. Interest on calf and operating		15.00		
11. Death loss (1%)		9.19		
12. Miscellaneous		1.00		
13. Fixed Costs (insurance, taxes, depreciation)		3.00		
A. Total Production Costs (sum 1 thru 13)		150.69		0.00
B. Operator Labor and Management				
C. Total Costs (A + B)		150.69		0.00
D. Hundredweight produced		2.5		
E. Feed Cost / cwt gain (1 + 2 + 3 / D)		32.20		#DIV/0!
F. Total Cost / cwt gain (C / D)		60.28		#DIV/0!
G. Beginning calf value	(550 lbs @ $ 1.67)	918.50	(lbs @ $)	0.00
H. Sale Weight (cwt)		8		
J. Breakeven Price / cwt (C + G / H)		133.65		#DIV/0!
K. Expected Selling Price / cwt	($ 144.00) Projected profit/hd	82.81	($)	#DIV/0!
L. 10% Higher Selling Price	($ 158.40) Projected profit/hd	198.01	($ 0.00)	#DIV/0!
M. 10% Lower Selling Price	($ 129.60) Projected profit/hd	-32.39	($ 0.00)	#DIV/0!
N. Breakeven Purchase Price at Expected Sales Price ($/lb)		1.82		#DIV/0!

Medium and Large #1 Feeder Steer Prices

750-800 Pounds, N.D., Weekly



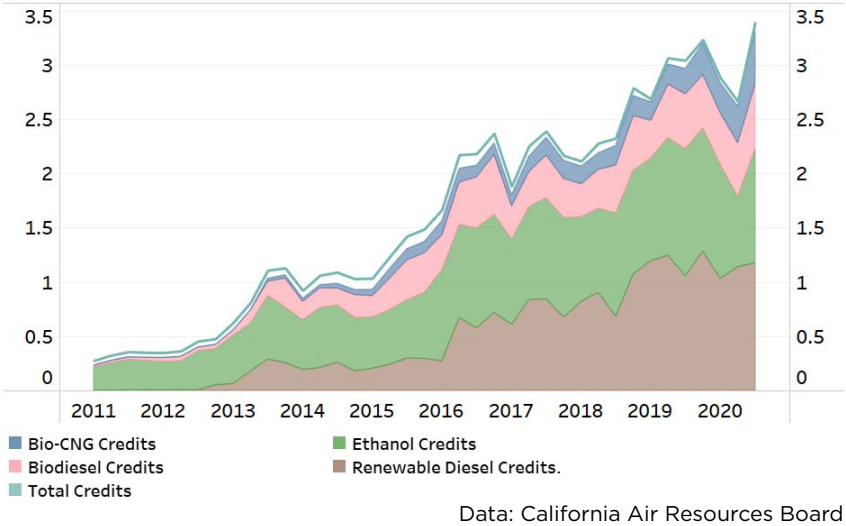
Decarbonizing Transportation

By David Ripplinger, NDSU Extension Bioproducts/Bioenergy Economist

As states and nations work to reduce carbon emissions, biofuels continue to play the leading role.

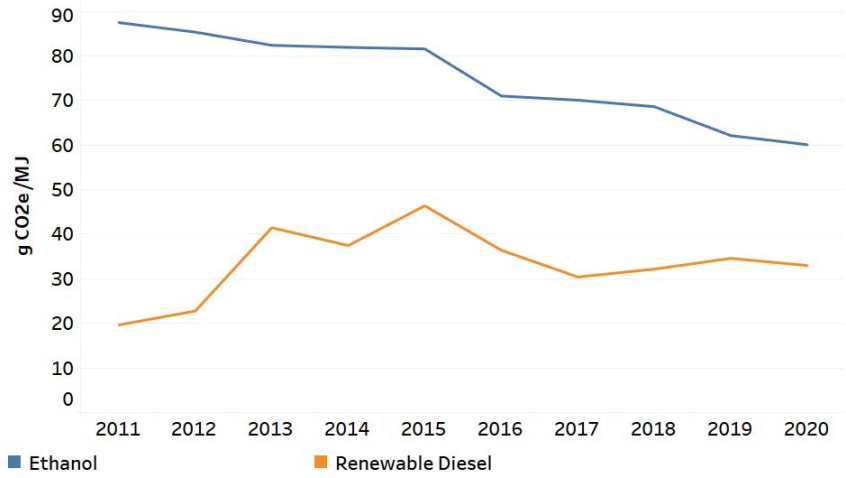
While federal policy mandates the use of biofuels, low-carbon fuel policies such as California's provide flexibility in how carbon reduction goals are met. This cap-and-trade system has resulted in increased use of ethanol, biodiesel and, most recently, renewable diesel and bio-compressed natural gas (bio-CNG) because they are the lowest cost way to reduce emissions given infrastructure, fleet and other issues.

Credits (MT) Generated by Fuel by Quarter (Millions)



Data: California Air Resources Board

Average Carbon Intensity by Year



Data: California Air Resources Board

We focus on California because it is the nation's largest fuel market and its Low Carbon Fuel Standard (LCFS) is the policy against which all new policies are compared. The number of California carbon credits generated increased from less than 500,000 in the first quarter of 2011 to almost 3.5 million in the third quarter of 2020. Most impressively, just less than 98% of the carbon credits came from biofuels.

Not only have biofuels been the primary means of carbon reduction in California, because of the market-based incentives from cap-and-trade, the carbon intensity of these fuels has fallen dramatically in the last five years. This is most impressive with regard to corn-ethanol, where the average carbon intensity has declined from 90 grams of CO_2 emitted per megajoule to 57.8 in the third quarter of 2020. This is, in part, due to California attracting the lowest-carbon ethanol to its market, but also because corn-ethanol refineries have become more efficient and adopted carbon-reducing technology in response to market signals.

Looking to the future, biofuels appear to have even greater opportunities and challenges. As California's mandated carbon emissions continue to decline, other states and nations are adopting low carbon fuel standards that mirror the California policy very closely.

Carbon capture and sequestration could make many biofuels carbon negative and conservation tillage methods could reduce footprints even further. While biofuels are almost certain to lose some market share to alternative fuels such as hydrogen and electric vehicle platforms in the future, they play the key role in decarbonizing transportation today.